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Renal Data from Asia-Africa

Survey the Seroprevalence of CMV among Hemodialysis Patients in Urmia, Iran

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ABSTRACT. Cytomegalovirus (CMV) causes infection in immunocompromised, transplant recipients and those who received blood transfusion frequently. Risk factors for primary CMV infection are blood transfusion (including clotting factors, etc), recipients of infected transplants, hemodialysis and the frequency of dialysis in a week. This study aimed at determining the prevalence of cytomegalovirus (CMV) antibodies in end-stage renal disease (ESRD) patients who undergo hemodialysis. A cross-sectional study of hemodialysis patients in Urmia, Iran was undertaken in 2007. Sera of 84 Hemodialysis patients were investigated for CMV-specific immunoglobulin G (IgG). Forty-four (52%) patients were males. 65 patients (77.4%) were anti-CMV IgG positive and 6 (7.1%) were anti-CMV IgM positive. There was no relationship between the antibody titer and dialysis duration, or frequency of HD in a week. In conclusion, we recommend that every patient who has undergone hemodialysis receive blood products free of CMV if CMV negative to reduce the incidence and prevalence of CMV among HD patients.

Introduction

Cytomegalovirus (CMV), is a herpes virus and endemic for all areas in the world. CMV infections are common and usually asymptomatic in otherwise healthy children and adults.¹ CMV has a worldwide distribution, infecting between 40% and 90% of adults, leading to lifelong latent infection.²

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Recipients of solid-organ or hematopoietic-cell allografts and individuals with advanced AIDS and immunocompromised state, CMV is a well-known cause of serious morbidity, increasing health care cost and sometimes fatal infections.^{3,4} In United States of America an about 8,000 newborns have health problems each year as a result of congenital CMV infection.⁵ Analysis conducted in the early 1990s revealed that the estimated costs to the U.S. healthcare system associated with congenital CMV infection were approximately \$1.9 billion annually⁶, with a cost per affected child of over \$300,000.⁷

Data regarding the prevalence of CMV antibody among healthy people in Iran is scanty,

Table 1. Cytomegalovirus infection among the different age groups of hemodialysis patients

Age	≤ 39 Years	40-69 Years	≥ 70 Years
Total	15 (17.8%)	49 (58.9%)	20 (23%)
CMV negative	2	8	3
Previous infection	12	38	15
Secondary or active infection	1	3	2

but may reach up to 100 percent among donors and recipients, likely due to condensed population and socio-economic status.⁸

CMV causes infection in immunocompromised, transplant recipients and those who receive blood transfusion frequently, such as hemodialysis patients.⁹ Risk factors for primary CMV infection are blood transfusion (including clotting factors, etc.), recipients of infected transplants, hemodialysis, and the frequency of dialysis in a week.^{9,10}

Various studies demonstrated the appearance or elevation of anti-viral antibodies in hemodialysis patients. Also, CMV-related retinitis, hepatitis and pneumonitis have been reported.¹¹⁻¹⁵

With this background, our study aimed to determine the prevalence of CMV antibodies in end-stage renal disease (ESRD) patients' undergoing hemodialysis.

Material and Methods

We undertook a cross sectional descriptive study of all of non-emergent patients, referred to hemodialysis section of Taleqani Hospital, Urmia, Iran.

Serum samples

A total of 84 serum samples were tested for CMV seroprevalence collected in 2007 from the hemodialysis patients. Data was entered in a form including demographic information (age, sex, marital status, literacy status, residential status), data about the onset of renal failure and hemodialysis history.

Data was obtained by means of referring to medical records and personal interviews. Sera were identified with a unique identifier to ensure that only one sample from any subject was tested. These identifiers were removed from the samples before testing, and the samples were coded.

Study population

Age of the patients ranged between 23 and 82 years of age and stratified into the following

age groups: < 40, 40 to 69, > 70 years old. Approximately equal numbers of males and females were tested. Prevalence was calculated separately for each age group. All of HD patients included had volunteered for the study and signed the informed consent.

Serological testing

Serum samples were tested for CMV-specific immunoglobulin G (IgG) using a CMV IgG enzyme-labeled antigen test (Medac, Hamburg, Germany), and the results were interpreted according to the manufacturer's instructions. Samples with optical densities 10% or more below the cutoff were recorded as negative, those with optical densities between 10% below and 10% above the cutoff were equivocal, and all others were positive. If the sample's absorbance was within 10% of the cutoff level, the sample was retested and classified according to the retest result.

Statistical methods and ethical approval

The percentages of individuals with positive or negative results were determined for each age group and sex. SPSS software version 11.5 (Chicago, Illinois, USA) was used for the analysis (by descriptive statistics and chi-square test). Ninety-five-percent confidence intervals were calculated where appropriate, and *P* values of < 0.05 were considered statistically significant. Ethics approval was obtained from the Human Research Ethics Committee of the Urmia University of Medical Sciences.

Results

Mean age of the study population was 56 ±

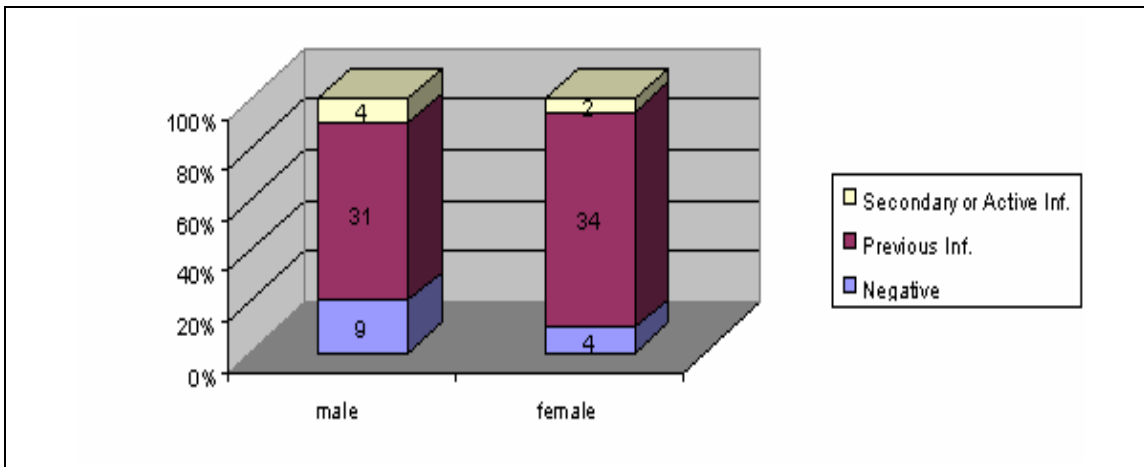


Figure 1. CMV status in males and females

16.18 years (23-82 years).

Only 13 patients (15.5%) were seronegative for CMV, 65 (77.4%) had previous infection, and finally 6 patients (7.1%) had a secondary or an active infection.

Most of HD patients included in our study were 40-69 years old (49 subjects, 58.9%) and majority of them were positive for CMV. 44 (52.3%) were male and 40 (47.6%) were female and CMV prevalence is shown in figure 1. 64 patients (76.1%) were residing in the city and 20 (23.8%) were living in rural areas. 52 of Urmia’s urban dwellers and 18 of patients living in villages near Urmia were seropositive for CMV. 4 of city residents and 2 of village residents had active infection.

73 (86.9%) of patients were married, 8 (9.5%) were single and 3 (3.5%) were widowed women. 60 of married patients and all of single (8 patients) or widowed group (3 patients) were seropositive for CMV. Only 6 of married patients had secondary or active infection.

CMV prevalence according to literacy is shown in table 2. Majority of the patients 77 (91.6%) were dialyzed 3-4 times a week with a seroprevalence of CMV of 66 (85.7%) of patients

with 3-4 sessions and 5 (71.4%) of patients with 1-2 sessions.

Majority of the patients 61 (72.6%) were undergoing HD < 5 years and 10 (11.9%) for more than 10 years. According to duration of hemodialysis 49 (80.3%) and 10 (100%) respectively were positive for CMV. Patients who were ESRD for more than 10 years, were seropositive for CMV. 3 of < 5 years group, 1 of 5-10 years group, and 2 of > 10 years group had acute CMV infection.

76 (90.4%) of patients underwent hemodialysis for less than 5 years. 3 patients with less than 2 years and 2 between 2-5 years of HD had acute CMV infection.

Discussion

This study was designed to determine the prevalence of cytomegalovirus (CMV) antibodies in end-stage renal disease (ESRD) patients’ undergoing hemodialysis.

In this study a high prevalence, 65 patients (77.4%) were anti-CMV IgG positive and 6 (7.1%) were anti-CMV IgM positive was found. There was no relationship between the anti-

Table 2. Cytomegalovirus infection among hemodialysis patients with different educational status

HD patients		Total	CMV Seropositive	Acute infection
Illiterate		48	39	3
Educated	Elementary	13	13	1
	Guidance	8	6	1
	High	13	10	1
	University	2	2	0

body titer and dialysis duration, or frequency of HD in a week.

Risk factors for primary CMV infection are blood transfusion (including clotting factors, etc.), recipients of infected transplants, hemodialysis, and the frequency of dialysis in a week.^{9,10}

Various studies demonstrated the appearance or elevation of anti-viral antibodies in hemodialysis patients. Also, CMV-related retinitis, hepatitis and pneumonitis have been reported.¹¹⁻¹⁵

Ikram H found that CMV infection didn't vary with socio-economic status or length of time on hemodialysis.¹¹ But in a study by Abbas MM et al from Cairo, high percentage of positivity for CMV antibodies in patients undergoing HD was noticed which also correlated to the number of the dialysis sessions.¹⁴ Similarly, Spisni C and his colleagues noted 67% of HD and CAPD patients having IgG CMC positivity.¹⁶

Our results are similarly high to our local study by AminZadeh Z et al from Tehran (91% seropositivity and 18.5% acute CMV infection).¹⁷ In their study also, there was no significant relationship between age, sex, literacy status, residential status, cause of renal failure, sessions of HD per week, duration of HD, and antibody titer of CMV in our study. These results do suggest a wide differences in the literature also as shown by Abbas and study by Ikram.^{11,14}

As mentioned in literature, blood transfusion is one of the major routes of CMV transmission. Since determination of CMV antibodies is not a part of the routine laboratory tests in blood transfusion centers yet and a high seroprevalence of CMV among general population could easily result in transmission.

In most of the literature, infection due to CMV is determined by seropositivity using ELISA method. We also used ELISA; however confirmation by PCR can document the presence of active disease requiring treatment.

In conclusion, ESRD patients undergoing HD should be screened for CMV and a long term outcome studies can help us to identify the risk associated or need for treatment in this population.

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